ONTARIO MINISTRY OF ENVIRONMENT
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OPERATING SUMMARY

PRESTON

water pollution control plant

1968

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Division of Plant Operations

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1968

Preston : water pollution control plant.
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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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PRESTON

water pollution control plant

operated for

THE TOWN OF PRESTON

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

During the year a total flow of 547.38 million gallons was treated at a cost of $61,420, or $112.21 per million gallons. During 1967, 421.18 million gallons were treated at a cost of $119.08 per million gallons. The cost per pound of BOD removed has remained constant at three cents since 1965.

In 1968 the plant treated an average flow of 1.49 mgd, 83% of the design capacity of 1.8 mgd. This design flow was exeeeded 25% of the time during 1968 and only 2% of the time in 1967. The flows inereased 30% in 1967 and 25% in 1966 over previous years. This indieates that the plant is rapidly approaehing the hydraulically overloaded stage. Preliminary expansion plans are now being eompleted by consulting engineers.

Percent reduetions of 97 in BOD and SS eompared with 97 and 98 respeetively in 1967. The average effluent BOD and SS eoneentrations of 15 and 22 mg/l compared with 13 and 14 mg/l respectively for 1967. The OWRC objective is 15 mg/l for each, but proeess difficulties were encountered in January and March.

The average raw sewage strength was 446 mg/l for BOD and 746 mg/l for suspended solids eompared with 455 and 686 mg/l in 1967. A by-law prohibiting the discharge of sewage containing more than 350 mg/l of BOD and SS was initiated in 1968 and should result in reduced loadings on the plants in the future.

The plant staff, under the supervision of head offiee engineers, operated a clean, attraetive and effieient plant for the Town of Preston during 1968.

PROJECT COSTS

STAGE 1

NET CAPITAL COST (Final) Long Term Debt to OWRC	$147,617.75
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 29,693.92
Net Operating	$ Nil
Debt Retirement	2,979.00
Reserve	665.70
Interest Charged	8,287.74
TOTAL	$ 11,932.44

RESERVE ACCOUNT

Balance at January 1, 1968	$ 8,284.49
Deposited by Municipality	665.70
Interest Earned	484.33
	$ 9,434.52
Less Expenditures	669.02
Balance at December 31, 1968	$ 8,765.50

STAGE 2

NET CAPITAL COST (Final)	$647.993.44
DEDUCT - Portion Financed by CMHC-MDLB (Final)	432.072.28
Long Term Debt to OWRC	$215.921.16
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 29,835.31
Net Operating	$ 61,420.06
Debt Retirement	4,357.00
Reserve	3.915.26
Interest Charged	12.122.56
TOTAL	$ 81.814.88

RESERVE ACCOUNT

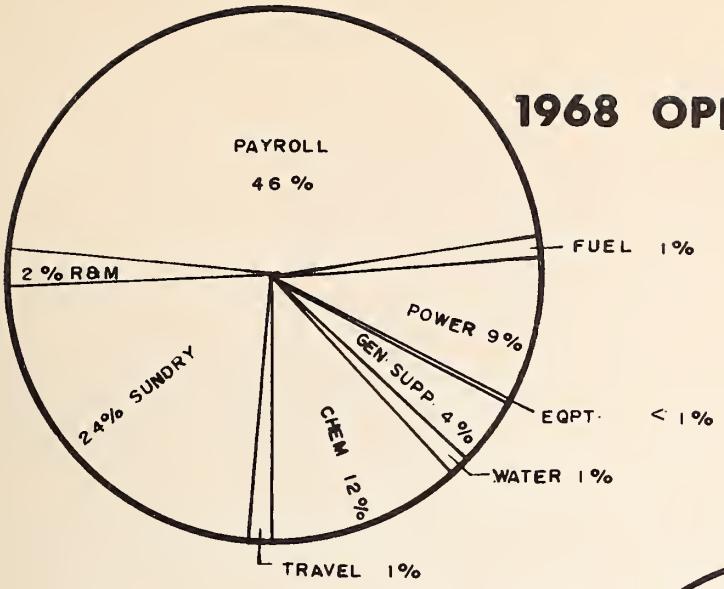
Balance at January 1, 1968	$ 16,255.04
Deposited by Municipality	3.915.26
Interest Earned	1.023.33
	$ 21,193.63
Less Expenditures	841.16
Balance at December 31, 1968	$ 20,352.47

Monthly Operating Costs

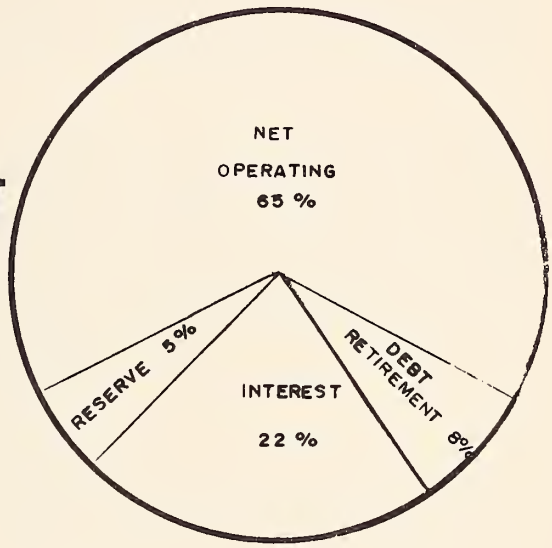
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	3534.85	1942.06	388.14	133.65	468.58	247.96	103.71	-	153.34	18.06	53.73	25.62
FEB	4514.98	1952.30	353.12	-	511.43	247.96	103.95	99.75	56.61	1189.86	-	-
MAR	5319.82	3002.56	346.84	252.99	455.87	-	164.50	71.40	(38.53)	980.08	53.73	30.38
APRIL	3451.08	1907.69	-	-	449.76	247.96	105.92	-	66.05	632.69	-	-
MAY	4801.28	1907.69	(137.60)	-	451.55	1297.96	163.86	59.73	274.13	705.45	53.73	24.78
JUNE	4659.13	1907.69	-	-	435.16	1126.87	142.45	-	109.80	937.16	-	-
JULY	4231.58	1924.13	-	-	474.49	259.91	153.91	-	-	1272.26	59.70	87.18
AUG	3968.25	2877.50	-	-	-	247.96	22.40	37.05	295.52	487.82	-	-
SEPT	3936.07	1910.70	-	-	961.44	254.36	119.80	1.91	-	592.60	59.70	35.56
OCT	4963.38	1963.98	-	-	-	254.36	108.40	-	-	2636.64	-	-
NOV	6389.26	1914.52		91.50	992.01	254.36	919.90	-	87.32	2455.74	59.70	114.21
DEC	11150.38	4048.53	-	92.37	486.36	2952.79	335.35	21.03	442.40	2692.25	-	79.30
TOTAL	61120.06	27300.36	950.30	570.51	5686.65	7392.45	2444.15	290.87	1446.64	14600.61	340.29	397.03

BRACKETS INDICATE CREDIT

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	284.33	$30,649.67	$107.80	2 1/2 cents
1965	326.71	36,292.57	111.08	3 cents
1966	336.95	43,359.79	128.68	3 cents
1967	421.18	50,152.64	119.08	3 cents
1968	547.38	61,420.06	112.21	3 cents

Process Data

The average raw sewage BOD content of 446 mg/l was 149% of the design value of 300 mg/l and the suspended solids content of 746 mg/l was 214% of the design value of 350 mg/l. The total organic BOD and suspended solids loadings were 123% and 177% of the design values of 5400 and 6300 pounds per day respectively.

The 97% reduction in both BOD and suspended solids indicates excellent treatment, especially in light of the high loadings. Process difficulties resulted in deterioration of the effluent in the early part of the year. The average effluent BOD loading of 15 mg/l met the OWRC objective, but this objective was exceeded 39% of the time. The effluent suspended solids concentration averaged 22 mg/l which exceeded the 15 mg/l objective. This objective was exceeded 60% of the time.

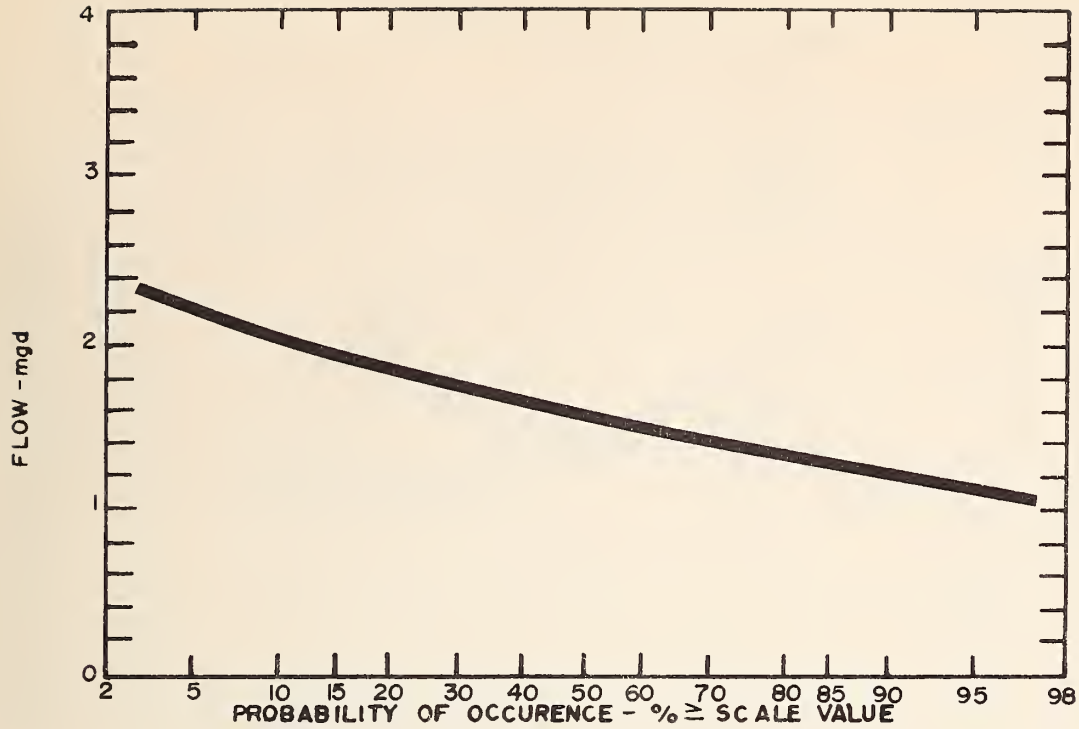
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10^3 lbs.	DOSAGE mg/l
JAN	42.02	1.36	2.20	.93	2.06	4.9
FEB	53.19	1.83	3.83	1.22	2.13	4.0
MAR	54.04	1.74	2.86	1.15	3.13	5.8
APR	50.00	1.67	2.14	1.08	2.09	4.2
MAY	45.68	1.47	1.72	1.02	2.82	6.2
JUN	41.09	1.37	2.26	.91	2.32	5.6
JUL	40.42	1.30	2.14	.84	1.84	4.5
AUG	47.61	1.54	2.88	.83	1.91	4.0
SEPT	46.83	1.56	2.26	1.00	2.02	4.3
OCT	43.94	1.42	1.59	.88	2.08	4.7
NOV	40.49	1.35	2.20	.88	2.15	5.3
DEC	42.07	1.36	1.79	.96	2.41	5.7
TOTAL	547.38	-	-	-	26.96	-
AVERAGE	-	1.49	-	-	2.25	4.9

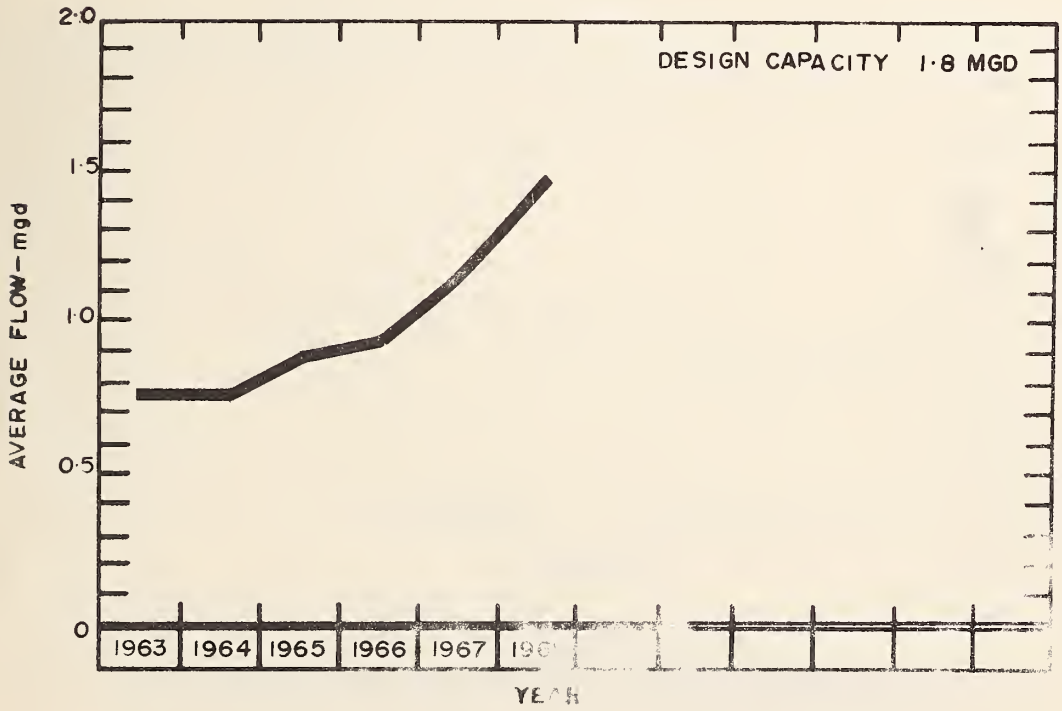
COMMENTS

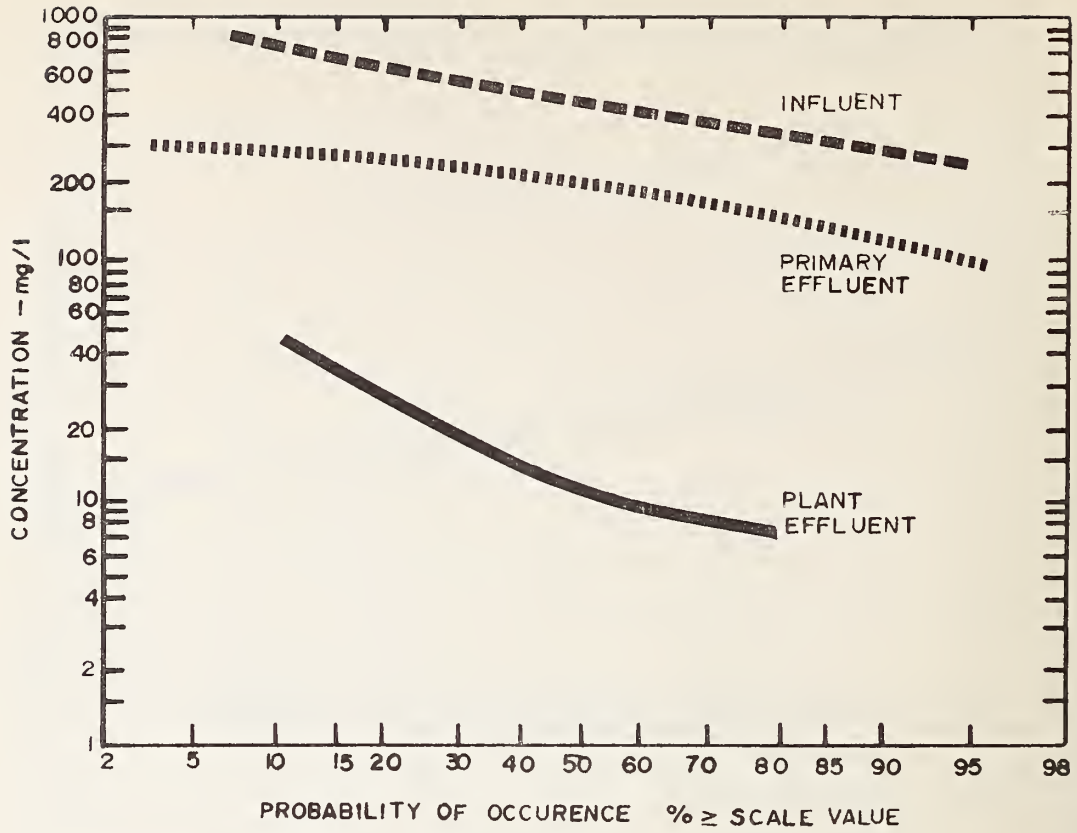
The average flow of 1.49 mgd was 83% of the design capacity of 1.8 mgd. This design flow was exceeded 25% of the time during the year. The maximum daily flow occurred in February and was 3.83 mg or 213% of the design capacity.

The average chlorine dosage of 4.9 mg/l was sufficient to maintain an average chlorine residual of 0.5 mg/l during 1968.

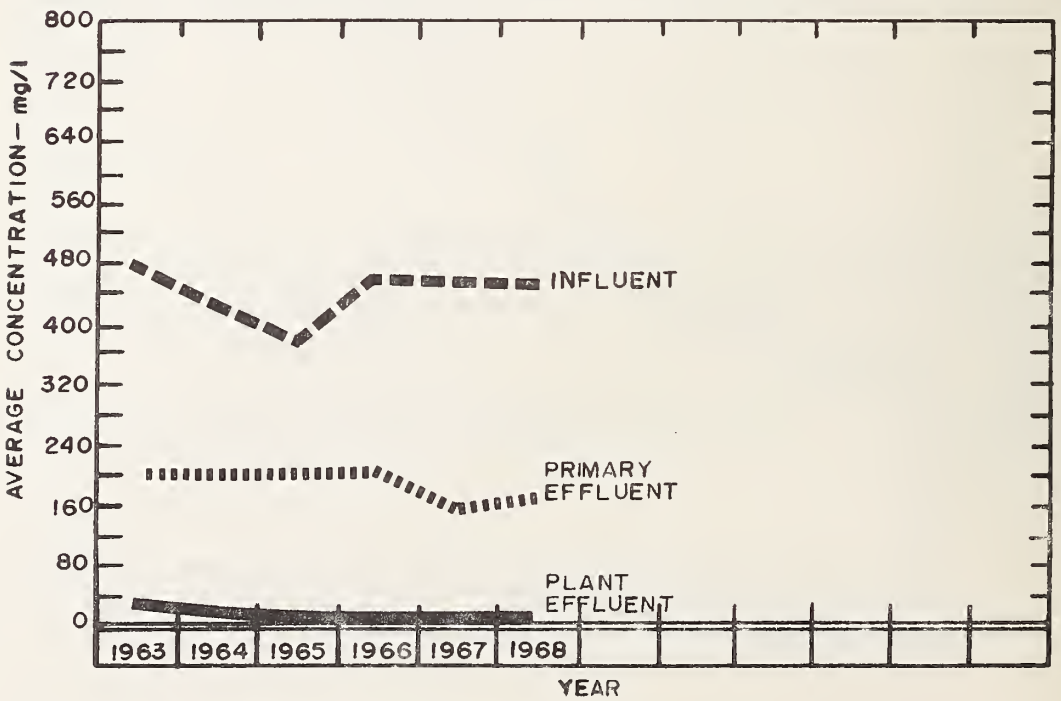

FLOW - mgd
4
3
2
1
0
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

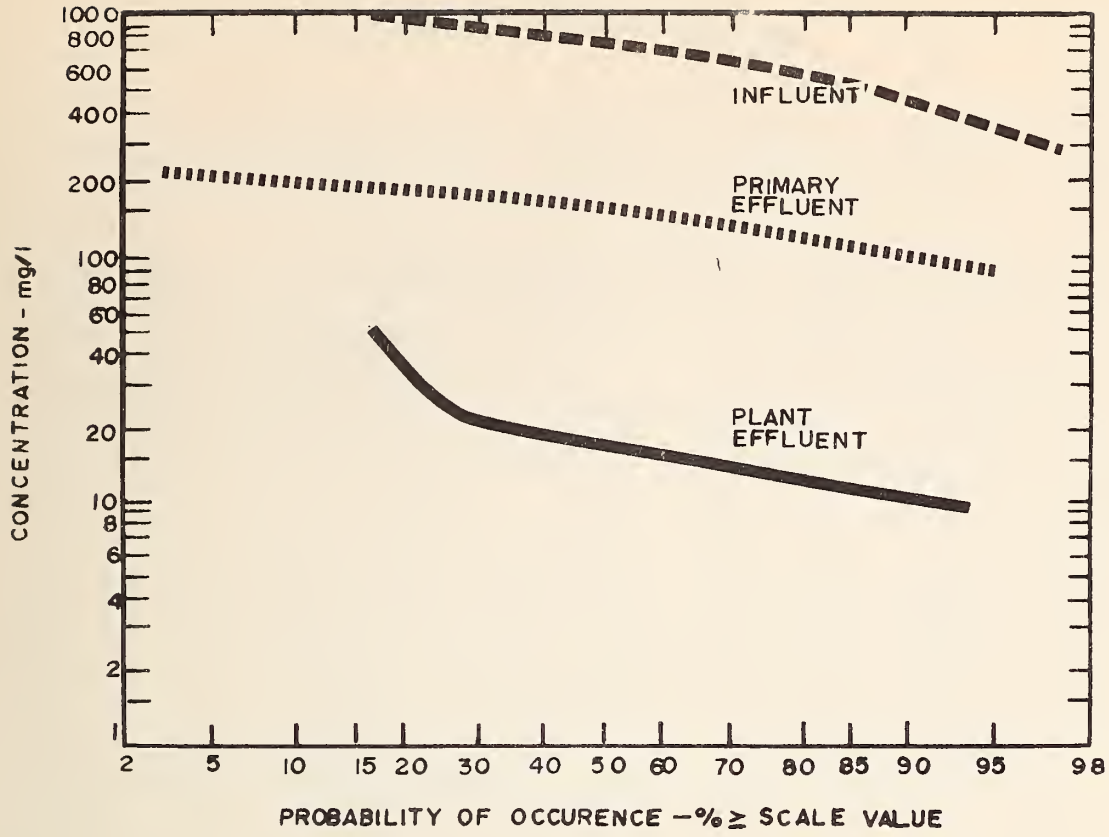
FLOWS


AVERAGE FLOW - mgd
2·0
1·5
1·0
0·5
0
DESIGN CAPACITY 1·8 MGD
1963
1964
1965
1966
1967
YEAR

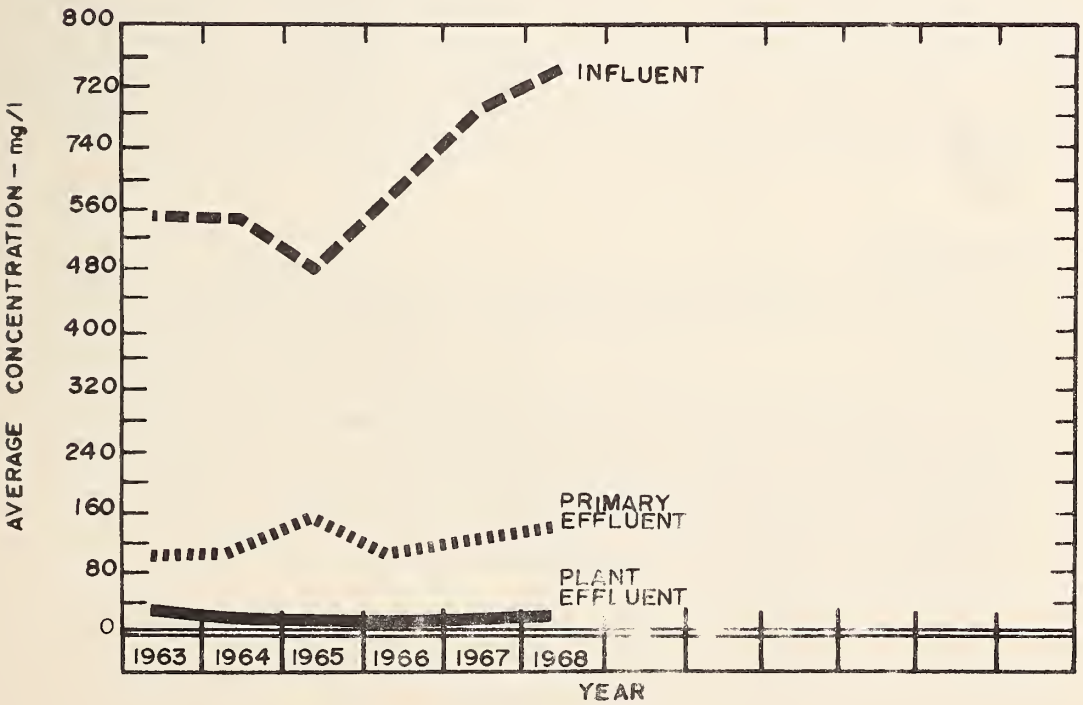


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	REMOVAL ft^3
JAN	305	35	88	1.13	633	58	91	2.42	61
FEB	405	20	95	2.05	1170	18	98	6.13	30
MAR	457	39	92	2.26	613	50	92	3.04	75
APR	–	–	–	–	–	–	–	–	136
MAY	260	7	97	1.15	334	12	96	1.47	122
JUN	380	5	99	1.54	864	7	99	3.52	78
JULY	387	8	99	1.53	819	10	99	3.27	82
AUG	370	10	97	1.71	580	16	97	2.68	77
SEPT	410	16	96	1.84	1190	18	98	5.49	167
OCT	1000	12	99	4.34	331	16	95	1.38	103
NOV	360	10	97	1.42	578	14	98	2.84	152
DEC	570	6	99	2.37	1100	20	98	4.54	138
TOTAL	–	–	–	–	–	–		–	1221
AVERAGE	446	15	97	1.78	746	22	97	3.34	102

COMMENTS

The average BOD and SS reductions of 97% indicate excellent treatment.

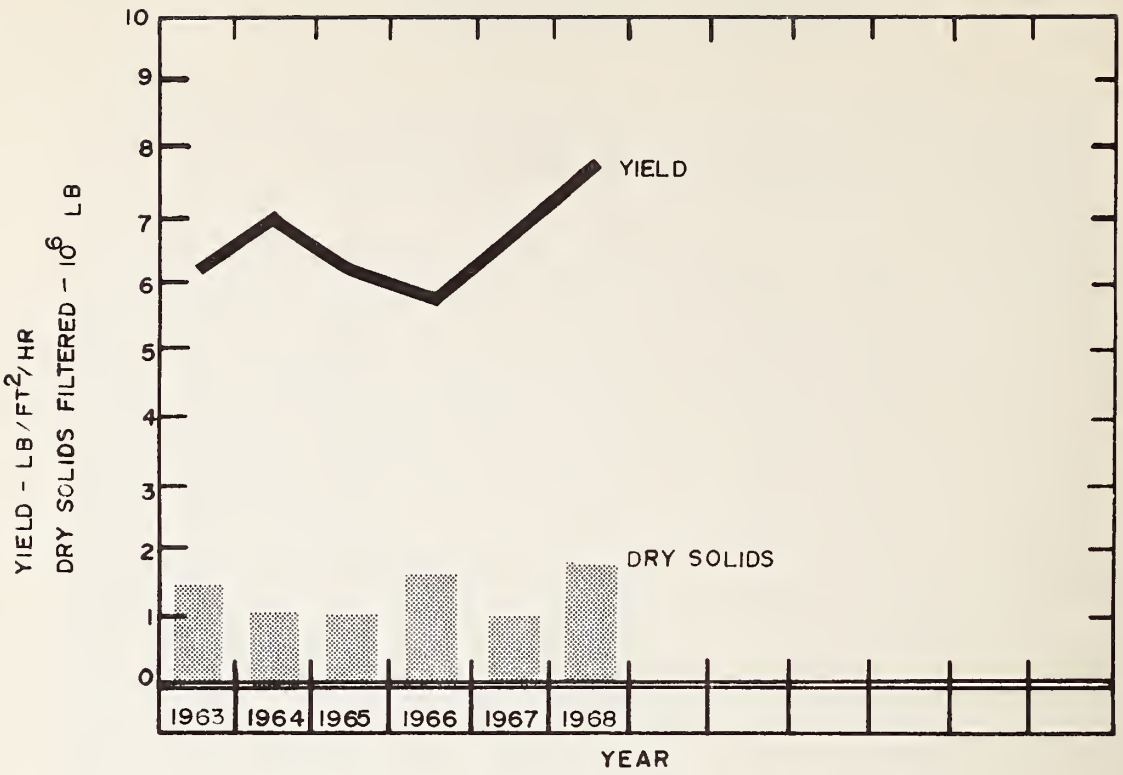
The average BOD and SS concentration of 446 and 746 mg/l respectively were well above the design values for these parameters and indicate very heavy organic loading on the plant. The degree of treatment provided indicates excellent control of the plant process. However, problems were encountered in the early part of the year, reducing the quality of the effluent during this period.

SLUDGE DISPOSAL

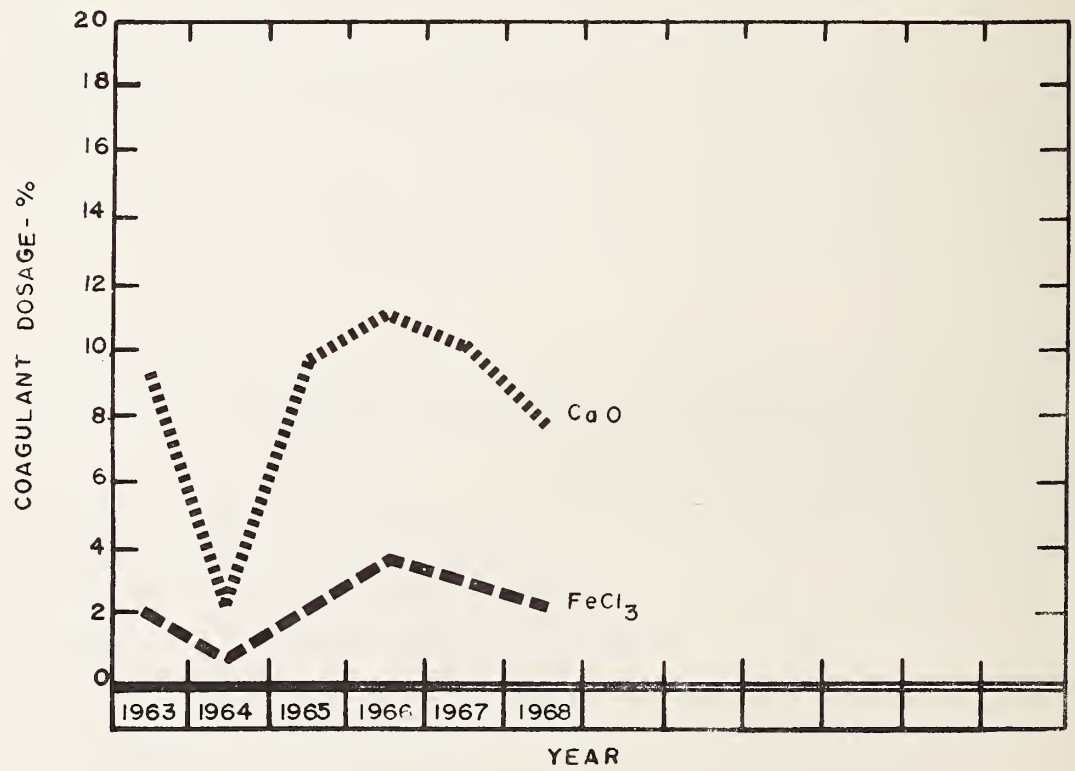
MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME gal	T. S. %	V.S. %	VOLUME gal	T. S. %	LIQUID yd^3	DEWATERED yd^3
JAN	2.35	9.4							450	470
FEB	2.06	11.3							210	420
MAR	1.59	11.2							0	370
APR	1.27	13.7							0	390
MAY	2.09	11.7							0	500
JUN	2.01	9.3							512	370
JUL	2.76	7.6							514	340
AUG	3.03	8.2							512	370
SEPT	3.08	7.7							630	432
OCT	3.65	7.1							674	484
NOV	3.61	6.9							1168	310
DEC	3.42	7.9							1092	306
TOTAL	30.92	-							5762	4762
AVERAGE	2.58	9.1							480	397

COMMENTS

The high organic loadings on the plant were reflected in the amount of sludge requiring disposal. A total of 5762 cu. yds. of raw liquid sludge and 4762 cu. yds. of sludge dewatered by vacuum filtration were hauled from the plant.



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE TO FILTER		CONDITIONING CHEMICALS						FILT. CAKE	* FILTR	YIELD
		CONC.	DRY SOLIDS	Ca O		Fe Cl$_3$		POLYMER				lb/ft^2
		T S %	10^3 lb	10^3 lb	%	10^3 lb	%	lb	ppm	T.S %	T.S. %	hr
JAN	92	9.5	1.81	12.7	7.0	2.9	1.6	0	-	25	0.9	8.0
FEB	90	11.3	1.93	7.4	3.9	2.3	1.2	0	-	26	0.9	8.6
MAR	82	11.9	1.67	8.3	5.4	1.9	1.2	13	1400	26	1.0	8.3
APR	85	13.6	1.69	13.5	8.0	3.3	2.0	0	-	26	1.1	8.1
MAY	96	11.5	2.00	17.5	8.7	4.8	2.4	0	-	24	1.0	8.4
JUN	81	9.4	1.52	11.8	7.8	3.4	2.2	0	-	25	0.8	7.6
JUL	92	7.5	1.34	13.5	10.0	3.8	2.8	0	-	23	1.0	5.9
AUG	92	8.0	1.49	12.4	8.3	4.2	2.8	0	-	24	1.0	6.6
SEP	83	7.9	1.67	15.5	9.3	4.0	2.4	0	-	23	0.9	8.0
OCT	71	7.2	1.87	19.2	10.3	5.0	2.7	0	-	22	1.1	8.2
NOV	59	6.9	1.13	12.0	10.6	3.5	3.1	0	-	21	1.2	7.7
DEC	53	7.9	1.13	10.1	9.0	2.7	2.4	0	-	23	0.9	8.7
TOTAL	976	-	19.25	154.1	-	41.8	-	13	-	-	-	-
AVERAGE	81	9.4	1.60	12.8	*8.0	3.5	*2.2	13	1400*	24	1.0	7.8

* FILTR. DENOTES FILTRATE PLUS WASH WATER

COMMENTS

The vacuum filter was run a total of 976 hours in 1968 compared with 605 hours in 1967. The average total solids content increased to 9.4% from 8.0% in 1967. The average solids content in the filter cake increased to 24% from 21% and the yield increased to 7.8 PSF/hr. from 6.8 PSF/hr. The dosage of lime decreased from 10.2% to 8% and ferric chloride decreased from 3.3% to 2.2%. These decreases can be expected with an increase in total solids when raw sludge is being filtered.

AERATION

MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		ML SS CONC^N mg/l	F/M ($\frac{lb\ BOD}{lb\ MLSS}$)	AIR USED ($\frac{1000\ ft^3}{lb\ BOD\ REMOVED}$)	WASTE SLUDGE 10^3lb
		BOD CONC^N mg/l	SS CONC^N mg/l	BOD CONC^N mg/l	SS CONC^N mg/l				
JAN	1.36	183	124	35	58	1,940	.18	-	15.7
FEB	1.83	127	137	19	17	1,920	.17	-	20.0
MAR	1.74	190	122	39	50	1,400	.33	-	43.8
APRIL	1.67	-	-	-	-	1,060	-	-	19.2
MAY	1.47	92	112	7	12	1,560	.12	-	92.4
JUN	1.37	180	115	5	7	1,880	.18	-	42.6
JUL	1.30	162	123	8	10	1,730	.17	-	40.2
AUG	1.54	205	167	10	16	1,680	.27	-	54.1
SEPT	1.56	250	186	16	18	1,440	.38	-	46.4
OCT	1.42	165	143	12	16	1,710	.19	-	54.2
NOV	1.35	205	216	10	14	1,870	.21	-	57.5
DEC	1.36	113	109	6	20	2,180	.10	-	69.5
TOTAL	-	-	-	-	-	-	-	-	555.6
AVERAGE	1.49	170	141	15	22	1,700	.21	-	46.3

CONCLUSIONS

Despite the high organic loading and the increased hydraulic loading, the plant maintained a high degree of efficiency for most of the year.

RECOMMENDATIONS

The addition to the plant should be continued without delay.

Water management in Ontario